first 10-12 hours, most likely due to release of drug sequestered on the sample surfaces. The total percent released from the cast films (Figure 6) were lower than that of the electrospun mats, as would be expected due to the much lower surface area of the former. The PLA/EVA 75/25 film released 30% of its tetracycline hydrochloride in 120 hrs, whereas the film of 50/50 PLA/EVA showed a slightly lower percent of release (25%) in the same period of time. Release from the PLA film was much lower, only 6% released in 120 hrs, whereas the PEVA film showed 8% release over the same period.

EXAMPLE 5

A mixture of cultured insulin secreting cells is seeded into an electroprocessed collagen matrix to form an electroprocessed collagen-containing tissue. The electroprocessed matrix containing the insulin secreting cells is implanted into a diabetic recipient in need of insulin. This electroprocessed collagen or fibrin-containing tissue optionally contains a vessel. The matrix is implanted into the retroperitoneal space and the vessel is anastomosed into the hepatic portal circulation. Insulin is released from the insulin-containing cell and transmitted to the circulation.

The electroprocessed matrix containing the insulin secreting cells is optionally supplemented with cells that synthesize and secrete glucagon, somatostatin, pancreatic polypeptide, or combinations thereof, in order to mimic the hormonal complement of the pancreatic islet.

Optionally, heterologous cells, (for example, engineered bacteria or cells from a conspecific donor) are placed in a matrix with a pore size that will allows diffusion of nutrients to the cells but does not allow or inhibits or delays the detection of the cells by the recipient's immune system.

EXAMPLE 6

Keratinocytes are harvested from a healthy site of a patient suffering from a chronic wound. The cells are grown in culture and transfected by electroporation to express VEGF. Next, the transfected cells are mixed or prepared in an electrospun collagen matrix. Antisense oligonucleotide for matrix metalloproteinases (MMPs) are also spun into the matrix. The matrix is topically applied to the surface of the wound. The cells near and in the implant take up the antisense sequences, express their transfected gene sequences and MMP

production is reduced. In other applications the cells may be genetically engineered to secrete VEGF, thereby promoting healing. Release of the antisense oligonucleotides suppress expression of MMPs, which are typically overexpressed in a chronic wound. Thus the wound site is repaired with an implant that simultaneously promotes natural healing responses. Optionally, the matrix is comprised of fibrin or a mix of fibrin and collagen. The fibrin assists in cessation of bleeding and promotes healing.

EXAMPLE 7

Osteoblasts from a patient with a bone injury are cultured and incorporated into an electrospun matrix comprising type I collagen. The matrix is formed in the shape of a cavity or defect at the injury site. Bone growth factor (BGF), bone morphogenic protein (BMP) or sequences of genes encoding for these proteins, are electrospun into the matrix are optionally incorporated into the electrospun matrix. The matrix assists in growth of new bone, and the BGF or BMP in the matrix promotes bone growth.

Optionally, the collagen used is produced *in vitro* by genetically engineered cells that express a collagen polymer with more P-15 sites than in normal collagen. The excess of P-15 sites promotes osteoblasts to produce and secretes hydroxyapatite and further aid bone growth.

Optionally, the matrix is further electroprocessed with polypyrroles, which are electrically active materials. Electrodes are attached to each end of the implanted matrix. Charged electrodes are later applied to the surface over the electrodes to create a small electric current across the implant to further facilitate healing of the bone injury. In another embodiment piezoelectric elements may be electrospun into the matrix to produce electric discharges that promote healing.

EXAMPLE 8

In another example, similar to that described for skeletal muscle a cardiac patch is prepared. A sheet of electroprocessed material is prepared with aligned filaments of collagen. The sheet is folded into a pleated sheet in the desired shape and or rolled into a cylinder. A second construct is electrospun in the desired shape, for example a rectangle. The pleated sheet that mimics the cellular layers of the intact heart is inserted into the electroprocessed rectangular form. The construct is filled with cells, sutured shut and placed in a bioreactor or directly in

situ. By aligning the fibrils of the pleated electrospun sheet of material in parallel with the long axis of the outer rectangular form, a cardiac, muscle-like construct is obtained. Native cardiac tissue is composed of layers of cells arrayed along a common axis with adjacent cell layers slightly off axis with the overlaying and underlying layers. This structure is more precisely mimicked by the methods described below in which a matrix is prepared and cells are directly electroprocessed, dribbled or sprayed onto the matrix as it is prepared. Cells in contact with the fibrils that are arrayed along the long axis of the sheet spread in parallel with the underlying fibrils of the sheet, forming a muscle construct of cells arrayed and layered in an in vivo-like pattern of organization. The construct can be directly implanted or placed within a RCCS bioreactor. Rates of rotation to maintain this type of construct in suspension range from 4-20 rpm, depending upon the mass of the tissue and the specific materials used to fabricate the outer cylinder. Variations of this design include the addition of angiogenic factors in the matrix, gene sequences, and agents to suppress inflammation and/or rejection. Other cell types may be added to the construct, for example microvascular endothelial cells, to accelerate the formation of a capillary system within the construct. Other variations in this design principle can be used. For example, cells may be electroprocessed into the matrix as it is deposited on the ground target. By varying the pitch of the fibers during spinning and spraying, dribbling or electroprocessing cells onto the fibers as they are deposited very precisely controls the positioning of the cells within the construct.

All patents, publications and abstracts cited above are incorporated herein by reference in their entirety. It should be understood that the foregoing relates only to preferred embodiments of the present invention and that numerous modifications or alterations can be made therein without departing from the spirit and the scope of the present invention as defined in the following claims.